Status of the DZero Run IIb Upgrade Project

- Comments on the silicon decision
- New project scope, "rebaselining"
- Installation & commissioning of the new project
- Conclusions

I will deliberately keep this brief, leaving the project/technical meat to the speakers that follow…

A Word of Thanks…

- Run IIb has been in the cross-hairs since Day 1
  - Was proposed, baselined, and mounted in worst possible climate:
    - DOE regulations, oversight oppressive
    - Fermilab, Directorate under enormous scrutiny
    - Run IIb proposed 6 months after Run II began, when readout, triggers for major IIa subsystems were still not complete
  - Luminosity projections kept degrading beneath us
  - Pressure has been enormous, constant specter of cancellation
- Nevertheless, project did what was necessary to baseline under these conditions
- Technical progress & managerial requirements were met, and project was/is in excellent shape
  - Director: " The silicon detector teams in each collaboration have planned the upgrade project well and have made excellent progress. They deserve great credit for their rapid progress to date."

A Word of Thanks…

- My thanks and gratitude to everyone on the project, all of whom fought so valiantly during this episode in absurdity. A more trying time I could not imagine.
  - Silicon especially, but not exclusively – all of us have felt it, daily
- The silicon team did a great job, and deserved far better than they got…

Comments on the Silicon Decision

- It is unfortunate, but we have to date not been given an adequate reason for the silicon cancellation
- In coming to this decision, the Director did not seriously evaluate our latest project plan:
  - Short shutdown, shadowed by already-declared accelerator shutdown
  - No, or minimal, interruption of complex (including CDF data-taking)
  - Physics gains independent of how Tevatron performs
    - Accelerator achieving its base (design) goal yields X1.5 (X2) increase in "IDWL" (integrated double-b-tag-weighted luminosity)
    - Silicon upgrade has clear motivation independent of radiation damage
  - Physics gains insensitive to 50% increase in commissioning time
  - In contradistinction to the CDF replacement, the DZero silicon upgrade is a performance upgrade
- The new plan provided an entirely new basis on which upgrade should be evaluated – changes the argument, and justification, completely
  - If physics concerns were the real issue, discontinuing the DZero silicon upgrade would not even have been considered

Silicon Decision
(cont'd)

- Director did "not have chance to review the newly proposed schedule in the way that would be needed to build it into the project"
  - Not sure I know what this means, but it does support his verbal statements he "did not consider the new installation schedule"
- Financial arguments vacillated within ~ 3 weeks' time:
  - "There is no money for these upgrades"
  - "Money is the context for the decision" (sounds like the kind of "wordsmithing" I used to employ to get out of doing my homework)
  - "Money is irrelevant"
- So: (1) the plan was not seriously considered, (2) money is not a driving factor, (3) physics gains in the base plan are strong and well-motivated, (4) little or no interruption to the running of the complex. Moreover, plan itself made fully available to scrutiny by the community in comprehensive documentation (including MS Project)
- Why, then, was this upgrade terminated?

Silicon Decision
(cont'd)

- I cannot answer that, but I believe this experiment cannot simply accept a decision of such import to its own future – the cancellation of an already-approved, well-motivated, and well-performing project that it so strongly endorsed and supported – for which no cohesive argument has been given, and the plan itself not even properly considered
- Project personnel deserve an adequate explanation
- I believe this situation requires that we respond
- As far as I am aware, the IB has not had the opportunity to meet, discuss, and respond to this decision – this forum provides that opportunity
- A letter has been drafted that we are presenting to the IB for its consideration and endorsement
- We address not the decision itself, but its basis

Moving Forward

- Despite the Director's silicon decision, those involved in the trigger and DAQ/Online projects remain strongly committed to seeing through their designs, implementing the improvements to the DZero trigger systems they've devised
  - Motivation for the trigger, DAQ/Online is still relevant as luminosity increases
    - Base (design) accelerator projections reach peak instantaneous luminosities of 1.6 (2.9) E32, well pushes the limit of our current system
  - See talk by Vivian O'Dell
- While by no means a substitute for the upgraded Run IIb silicon, Layer 0 offers palpable improvements, provides a hedge against inner-layer radiation damage
  - Maintain pattern recognition, impact parameter resolution
  - Critical mass of personnel being assembled – interest is there
  - See talk by Ron Lipton
- Project is still on board

Run IIb Project Organization

Oct '03

DØ Run IIb Project
J. Kotcher, Project Manager
V. O'Dell, Deputy (Trigger/DAQ); R. Lipton, Deputy (Silicon Layer 0)
W. Freeman, Associate, M. Johnson, Technical Coordinator
D. Knapp, Budget Officer; T. Erickson, Administration

Silicon sub-project under reconsideration to accommodate Layer 0

WBS 1.1 Silicon
M. Demarteau
G. Ginther

- 1.1.1 Sensors
  R. Demina, F. Lehner
- 1.1.2 Readout System
  A. Nomerotski, E. von Toerne
- 1.1.3, 1.1.5 Mechanics & Assembly
  W. Cooper, K. Krempetz
- 1.1.4 Production
  J. Fast
- 1.1.4 QA, Testing, & Burn-in
  C. Gerber
- 1.1.6 Monitoring
  M. Corcoran, S. de Jong
- 1.1.7 Software & Simulation
  D. Buchholz, E. Shabalina
- 1.1.8 Administration
  (M. Demarteau)

WBS 1.2 Trigger
P. Padley
D. Wood

- 1.2.1 L1 Cal Upgrade
  M. Abolins, H. Evans, P. LeDu
- 1.2.2 L1 Cal/Track Match
  K. Johns
- 1.2.3 L1 Track Trigger
  M. Narain
- 1.2.4 L2β Upgrade
  R. Hirosky
- 1.2.5 Silicon Track Trigger
  U. Heintz
- 1.2.6 Simulation
  M. Hildreth, E. Perez
- 1.2.7 Administration
  (D. Wood)

WBS 1.3 DAQ/Online
S. Fuess
P. Slattery

- 1.3.1 Level 3 Systems
  D. Chapin, G. Watts
- 1.3.2 Network & Host Systems
  J. Fitzmaurice, S. Krzywdzinski
- 1.3.3 Control Systems
  F. Bartlett, G. Savage, V. Sirotenko
- 1.3.4 DAQ/Online Management
  (P. Slattery)

WBS 1.4 Project Administration

WBS 1.5 Installation
R. Smith

- 1.5.1 Silicon Installation
  Mechanical:
  H. Lubatti
  Electronics:
  L. Bagby, R. Sidwell
- 1.5.2 Trigger Installation
  D. Edmunds

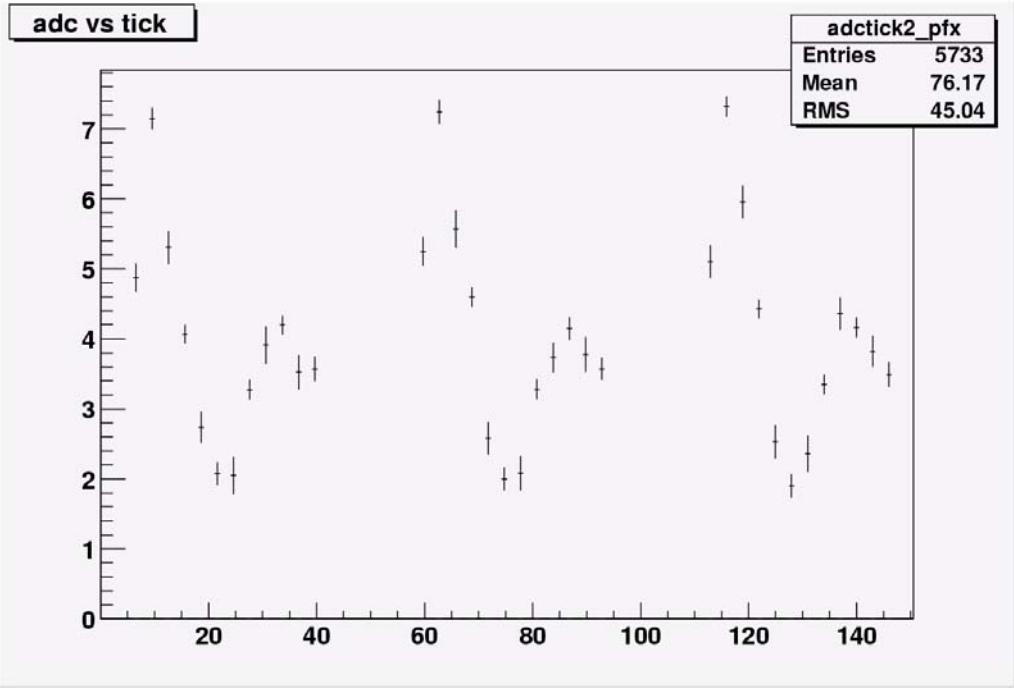
Adjustments continue to be made…

New Project Scope

- Trigger & DAQ/Online projects continue as before, no change in scope
  - Includes Silicon Track Trigger, which will be augmented to accommodate layer 0
  - See talk by Vivian O'Dell
- Silicon project scoped down to Layer 0 detector, inserted in existing silicon detector
  - ~ 12k channels, mounted on Run IIb beam pipe (in hand)
  - Proposal, project plan almost complete
  - See talk by Ron Lipton
- Remaining open issue: performance upgrade of Fiber Tracker readout/triggering capability
  - New Analog Front-End Boards ("AFE II") and trigger (TriP) chip
  - Tracking enhancement in light of cancellation of silicon upgrade
  - Considerably improved noise performance, z-information from timing
  - R&D in progress, studies being completed
  - Will be reviewed internally to DZero before proceeding further

AFE II

- Motivation to replace current analog front-end boards (AFE) for the CFT
  - Problems with pedestal width and stability
    - Tick to Tick problems and problems within a tick
  - Data Size
    - SVX unused channel problem
- Ped Problem produces effective cut in light yield
  - May be as much a 2 pe effect



ADC v. Tick variation

AFE II

- AFE II
  - Full New set of boards
  - No SIFT No SVX
    - TriP (or Trip*t*)
      - TriP chip submission very successful – meets spec.
    - Commercial Flash ADC
    - Otherwise integrates completely with existing system
  - Prototype tests look very good
  - Full board prototype schedule for fall, but has been delayed by shutdown
  - Expect
    - Improved reliability
    - Improved Ped dispersion and stability
    - Added Functionality with new submission of TriP Chip - Trip*t*
      - z information from timing (2 ns resolution)
        - Speeds track reco (Tests by G. Borissov indicated almost factor of 2)
        - May improve CFT hit clustering

Target Dates

- Sep 10 – Initial Layer 0 proposal submitted for Laboratory reaction
  - Sep 18 - Encouraged by Director to proceed
- Oct 14 – Initial proposal for rebaselined project presented to & discussed with Laboratory at PMG
- Oct 31 – Draft rebaseline proposal to DOE/OHEP
- mid-Nov – mini-review of rebaselined project
  - ~ two outside reviewers (PAC members?) + project experts (Temple, Hoffer, etc.)
- Nov 19 – Final submission of everything to DOE
- Nov 24 – DOE ESAAB to decide on granting CD-3b, final approval to complete project

This process is on a very compressed schedule (canonical state…)

Installation & Commissioning in the Rebaselined Project

- Recrafting the project in light of the silicon cancellation results in some significant changes to logistics, and associated impact to the running experiment
- Prior to silicon cancellation, base project plan called for installation of all elements to be synched to silicon completion
  - Minimize perturbation to experiment
  - Start March '06, ~ 14 weeks
- Installation now no longer constrained in this manner - will in principal be able to proceed as soon as fabrication and testing of a given sub-project is completed
- Much of installation will be able to be shadowed by regular summer shutdowns (including Layer 0), but commissioning of trigger systems will not come for free

Installation & Commissioning

- All of the aforementioned must, and will, be negotiated with the collaboration
- However, installation and commissioning is an integral portion of the plan for these upgrades, and is part of what I ask you to consider when the project plans are presented today, and in Nov for your final evaluation & sign off
  - Interruptions in acquisition of useful luminosity should be included in your deliberations

Conclusions

- Silicon decision was a blow. Morale slowly healing, but full repair will require adequate explanation of reasons for cancellation.
  - My thanks again to the silicon group for all they've done
- Basis for silicon termination is inadequate, and demands clarification
- Trigger, DAQ/Online personnel still highly motivated, and strongly committed to completion
- Layer 0 will be part of rebaselining proposal, commitment is there
- AFE II/TriP to be reviewed internally as soon as possible
- Would like collaboration to reiterate their support of the rebaselined Run IIb project before final plan is submitted to DOE toward the end of November